Radiation Tolerant, FPGA-based SmallSat Computer System (RadSat)

Completed Technology Project (2013 - 2016)

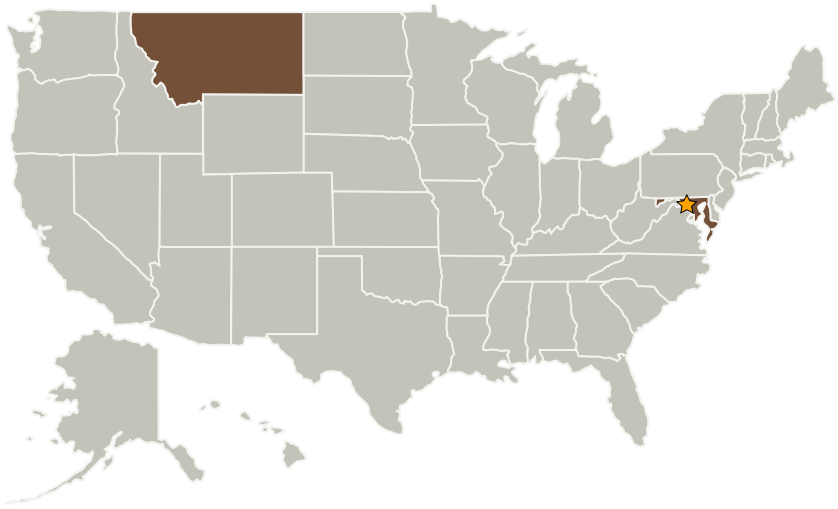
Project Introduction

The goal of this project is to mature the technology readiness of a radiation tolerant smallsat computer system for a subsequent orbital flight demonstration. The system is implemented with commercial off-the-shelf (COTS) field-programmable gate arrays (FPGAs) to provide space-computing performance that improves upon existing radiation hardened processors. Commercial FPGAs are now yielding acceptable levels of total ionizing dose immunity due to the thinning of gate oxides and relative deepening of isolation trenches. If a single event effect mitigation strategy can be implemented on COTS FPGAs, then reliable, high performance space computing can be accomplished at a fraction of the cost of existing radiation hardened processors.

Anticipated Benefits

This technology will increase on-board processing at a significantly reduced cost over existing systems.

Primary U.S. Work Locations and Key Partners



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Organizations Performing Work	Role	Type	Location
★Goddard Space Flight Center(GSFC)	Lead Organization	NASA Center	Greenbelt, Maryland
Montana State University - Bozeman	Supporting Organization	Academia	Bozeman, Montana

Primary U.S. Work Locations	
Maryland	Montana

Links

ESA RadSat Page
(https://directory.eoportal.org/web/eoportal/satellite-missions/r/radsat)

Project Website:

https://www.nasa.gov/directorates/spacetech/home/index.html

Organizational Responsibility

Responsible Mission Directorate:

Space Technology Mission Directorate (STMD)

Lead Center / Facility:

Goddard Space Flight Center (GSFC)

Responsible Program:

Small Spacecraft Technology

Project Management

Program Director:

Christopher E Baker

Program Manager:

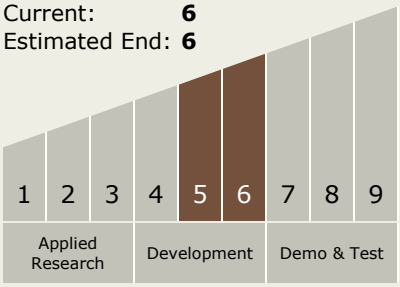
Roger Hunter

Principal Investigator:

Brock Lameres

Technology Maturity (TRL)

Start: **5**
Current: **6**
Estimated End: **6**



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Technology Areas

Primary:

- TX02 Flight Computing and Avionics
  - TX02.1 Avionics Component Technologies
    - TX02.1.1 Radiation Hardened Extreme Environment Components and Implementations

Target Destination

The Moon